EMERGENCY ISSUE Price 6d.

# THE ENGINEER

JULY 3, 1959 28 ESSEX ST., STRAND, LONDON, W.C.2 VOL. 208 No. 5397

## PUBLIC APPOINTMENTS

### LONDON COUNTY COUNCIL
WESTMINSTER TECHNICAL COLLEGE
Vincent Square, S.W.1.

Required September 1959 owing to reorganisation and expansion of work.

DEPARTMENT OF CIVIL ENGINEERING

1. SENIOR LECTURER. Subjects to include Strength and Properties of Materials and Engineering Metallurgy.
2. LECTURER. Principal Subjects; Principles of Electricity.
3. LECTURER. Subjects to include Soil Mechanics; knowledge of Hydraulics and/or Engineering Geology an advantage.

DEPARTMENT OF MECHANICAL AND GAS ENGINEERING

4. LECTURER. Mechanical Engineering Subjects.
5. ASSISTANT, GRADE B. Mechanical Engineering Subjects.
6. ASSISTANT, GRADE B. Mainly for Chemistry, Engineering Science (including Electricity) and Physics.

**General Information**

For Post 1 Graduate with good industrial and full-time teaching experience required. For Posts 2, 3 and 4 Graduate or equivalent qualification, industrial and teaching experience required. For Posts 5 and 6 preferably Graduate or equivalent qualification required. Experience in Industry desired (for Post 6 preferably in the Gas Industry).

Burnham (F.E.) Salary Scale (Men): Senior Lecturer £1,417 10s. x £52 10s. to £1,627 10s.; Lecturer £1,260 x £31 10s. to £1,417 10s.; Assistant Grade B £682 10s. x £26 5s. to £1,076 5s. additions for qualifications and training; increments within scale for experience. Plus London allowance in all cases £37 16s. or £50 8s.

Application forms, from Secretary at College, to be returned not later than 10th July (1407). E6783

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### EAST MIDLANDS GAS BOARD
**Engineering and Production Department**

Appointment of:
(*a*) MECHANICAL ENGINEER
(*b*) ELECTRICAL ENGINEER

Applications are invited for the appointments of a Mechanical Engineer and an Electrical Engineer located at the Department's Headquarters in Derby. The commencing salary in each case will be in accordance with experience and qualifications, but not less than £1,750 per annum.

Appropriate professional qualifications, together with considerable experience in design, construction and maintenance of plant are essential.

The two Engineers would be Staff Officers responsible direct to the Assistant Chief Engineer and Production Controller and their duties would include planning, estimating and advising on all technical matters within their respective spheres. The Engineering and Production Department controls gas production in the major works in the Board's Area, ranging from Doncaster in the North to Northampton in the South.

Both appointments are pensionable and the successful applicants would be required to pass medical examinations.

Applications stating age, education, qualifications and experience, together with the names and addresses of two referees should be sent to reach the undersigned by not later than ten days after the appearance of this advertisement.

A. GWYNNE DAVIES,
*Secretary.*

Beverley House,
University Road,
Leicester.
June 17th, 1959. E6793

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### HACKNEY GROUP OF HOSPITALS
**London, E.9**

APPOINTMENT OF ASSISTANT ENGINEER

Applications are invited for the above appointment: Salary £565—£700 p.a.

The successful candidate will be required to undertake work connected with maintenance and operation of the Hospitals' engineering services (Mechanical and Electrical), including relief duties at any of the four Hospitals as necessary.

Experience in the operation of Oil-fired Boilers and possession of the ordinary National Certificate in Mechanical Engineering or a Ministry of Transport and Civil Aviation 2nd Class Certificate of Competency an advantage.

Application forms obtainable from the undersigned, above address, should be returned by 6th July, 1959.

J. D. B. MANNING,
*Group Secretary.*

Group Administrative Offices,
Hackney Hospital, E.9.
June, 1959. E6797

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### CENTRAL ELECTRICITY GENERATING BOARD

PRINCIPAL ASSISTANT ENGINEER required in the Civil Engineering Branch of the Design and Construction Department at Headquarters, London, S.E.1.

The successful candidate will be responsible for supervising the activities of a small number of Senior Assistant Engineers engaged on the critical examination of all aspects of building and civil engineering work associated with thermal and nuclear power stations and for dealing with major contractural claims.

Candidates must have wide experience in heavy civil engineering design and construction, some knowledge of building work and preferably a specialist knowledge of either soil mechanics, structural steelwork or prestressed concrete design. Experience in the design of modern power stations would be an advantage, and preference will be given to those who are Corporate Members of the Institution of Civil Engineers.

Salary within the range £2,160—£2,360 p.a.

Applications stating age, qualifications, experience, present position and salary, to the Personnel Officer, 24–30 Holborn, London, E.C.1, by 13th July. Envelopes should be marked "Confidential Ref. ENR/244". E6798

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### NATIONAL COAL BOARD
### NORTH EASTERN DIVISION

Vacancies in No. 4 (Carlton) Area, Grimethorpe, Nr. Barnsley, at new Central Workshops employing 400 men engaged in reconditioning mining plant and machinery and general engineering, overhauls and testing.

1. Chief Workshops Planner to control Planning and Progress Sections. Proved Engineering background and comprehensive experience of modern planning and production control techniques essential; H.N.C. (Mechanical or P.E.) with Electrical endorsement or equivalent qualification desirable.

2. Chief Workshops Inspector to control Inspection Section. Proved engineering background, extensive experience of mechanical and electrical testing procedures, knowledge of gauging techniques, ability to prepare and maintain inspection standards and thorough understanding of fits and limits essential. H.N.C. (Mechanical) with Electrical endorsement desirable.

Salary £900—£1,400 in each case. Apply giving full details to Area Staff Manager at above address by 17th July. E6826

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### GOVERNMENT OF QATAR
### PERSIAN GULF

ASSISTANT DISTILLATION PLANT ENGINEER
WATER DEPARTMENT

The Government of Qatar in the Persian Gulf invites applications for the post of Assistant Distillation Plant Engineer in the Water Department. The successful applicant will be required to assist the Distillation Plant Engineer in the maintenance of sea water distillation plants and the mechanical equipment of the department.

Candidates must have completed a regular apprenticeship of at least five years with a recognised organisation engaged in heavy engineering in dock, ship or railway yards. They should possess appropriate professional qualifications and have a wide experience in a supervisory capacity of marine maintenance engineering including steam plants and boilers. Experience as naval chief engine room artificers or merchant navy engineers will be a recommendation. Salary: According to scale E2, commencing at Indian Rupees 1775/– per Arabic month (equivalent to £1,598 per annum) with yearly increments of Rs.75 a month to Rs.2000/– then by Rs.100 to a maximum of Rs.2300/–. Contract offered is for five years subject to six months probation. Gratuity of one month's pay for every year of service payable on completion of contract only. Annual leave at rate of six days per month of duty. Free passages, accommodation, fuel, light, water, medical and dental treatment. No income tax. APPLICATIONS—endorsed "Asst. Distillation Plant Engineer" should be sent *in duplicate* to: C. Tennant Sons & Co. Ltd., 4 Coptall Avenue, London, E.C.2, giving full details of training, experience, age, nationality, religion, marital status, the names and addresses of three referees and a recent dated photograph. E6795

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### GOVERNMENT OF HONG KONG

PUBLIC WORKS DEPARTMENT
ELECTRICAL/MECHANICAL ENGINEER

Duties comprise the design, estimation, installation, operation and maintenance of air conditioning installations in large buildings including refrigeration plant.

Permanent and pensionable appointment. Salary £1,245—£2,178, plus cost of living allowance. Quarters at low rent. Free passages. Generous leave.

Candidates must be under thirty-five years and A.M.I.E.E. or A.M.I. Mech.E. with at least three years' post qualification experience in the refrigeration industry.

Write, Director of Recruitment, Colonial Office, London, S.W.1, giving age, qualifications and experience, quoting BCD. 112/51/033. E6796

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### MIDDLESEX COUNTY COUNCIL

HEATING AND VENTILATING ENGINEER (APT. IV)
£1,095—£1,250

Required initially at Westminster to act as leader of small section. Must have considerable experience in design of all branches of heating and ventilating work and be competent draughtsman in preparation of schemes, contract drawings and specifications for large Public Buildings.

Established, five-day week, prescribed conditions, commencing salary according to qualifications and experience.

Application forms from County Architect (s.a.f.e.) 1 Queen Anne's Gate Building, Dartmouth Street, S.W.1, returnable by 15th July (Quote Z848E.) E6824

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### LEICESTER GENERAL HOSPITAL
**Gwendolen Road, Leicester**
(486 beds)

Applications are invited for the post of SENIOR ENGINEER

Salary on the scale £680–£815 p.a. Candidates should have completed an apprenticeship in mechanical engineering or have otherwise acquired a practical training in mechanical engineering as distinct from a purely craft training. They must also hold a First Class Certificate of Competency in Marine Engineering (or equivalent Naval Certificate) or an approved equivalent qualification which includes heat and heat engines, and an endorsement in the principles of Electricity.

Candidates should have had previous experience in a supervisory position of hospital or similar mechanical and electrical services and have a sound knowledge of the principles and practice of the efficient operation and maintenance of boilers, engines and other steam plant.

The person appointed will be required, with other engineers, to take part in an "On Call" rota. Accommodation is available if required. The Post becomes vacant on the 1st August, 1959. Applications stating age, qualifications and experience, together with names of three referees (who should be present and/or past employers) to the Group Secretary, The Leicester Royal Infirmary, within fourteen days of this advertisement. E6816

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### EAST RIDING HOSPITAL MANAGEMENT COMMITTEE

ASSISTANT ENGINEER

Applications are invited for the post of Assistant Engineer at Broadgate Hospital, Beverley. Applicants should have served an Engineering Apprenticeship and be in possession of either the Ordinary National Certificate or Certificate of Competency in Marine Engineering. Experience of steam generation, heating and domestic hot water plant and electrical installations is essential.

The successful Candidate will be responsible to the Superintendent Engineer for Engineering Maintenance and will be required to reside at the Hospital where a house is available at a reasonable rental.

Salary scale £575 x £25 (5) to £700. Further details are obtainable from the Superintendent Engineer, Westwood Hospital, Beverley, and applications stating qualifications and experience with the names of three referees should reach the undersigned by the 17th July, 1959.

The Secretary,
Broadgate Hospital, Beverley,
E. Yorkshire.
E6802

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### CITY OF BIRMINGHAM
**Salvage Department**

APPOINTMENT OF SENIOR ENGINEER

Applications are invited for the post of Senior Engineer in the above Department at a salary within the range £1,385 to £1,620.

Candidates must be qualified engineers and the person appointed will be responsible for the installation and maintenance of the mechanical and electrical plant, and for building work, at the various Refuse Disposal and Salvage Works of the Department.

Full details of the appointment may be obtained from the undersigned to whom the completed applications must be delivered not later than Thursday, 16th July, 1959.

ALAN E. BARTON,
*General Manager.*

Civic Centre,
Broad Street,
Birmingham 1.

## PUBLIC APPOINTMENTS

### THE ROYAL COLLEGE OF SCIENCE AND TECHNOLOGY GLASGOW

### DEPARTMENT OF ELECTRICAL ENGINEERING

Applications are invited for a
**LECTURESHIP in ELECTRICAL TECHNOLOGY**

Duties include lecturing to undergraduate and postgraduate classes. Participation in research work encouraged. The salary for the post is in the range £900 x £50 to £1,350 x £75 to £1,650 with F.S.S.U. and family allowances, the initial salary depending upon qualifications and experience. Application forms from the Secretary, George Street, C.1. E6804

### SEVERALLS HOSPITAL
**Colchester, Essex**

SENIOR ENGINEER

Applications are invited for the post of Senior Engineer at the above Mental Hospital (1,983 beds). Salary at present £770 x 25(1) x 30(4) to £915 per annum. National Health Whitley Council conditions of service.

Candidates must have had practical experience in maintenance and operation of steam boilers, steam and electrical plant and services. The Superintendent Engineer also acts as Clerk of the Works and preference will be given to candidates possessing a knowledge of building maintenance work. Applications are asked to indicate any experience of estimating, etc.

Unless eligible for promotion through previous Health Service experience, the successful applicant should have passed an examination in engineering technology, and hold one of the following qualifications or approved equivalent, viz: M.T.C.A.

First Class Certificate of Competency in Marine Engineering: M.T.C.A. Certificate of Service as First Class Engineer City and Guilds full Technological Certificate in Plant Engineering (First Class).

A three bedroomed house will be available at a moderate rental, where the Senior Engineer will be required to reside.

Applications stating age, qualifications and experience, together with the names of two referees, should be sent to the Group Secretary within 21 days of the appearance of this advertisement. E6811

### SHEFFIELD CORPORATION WATERWORKS

**CHIEF ASSISTANT (HEAD WORKS)**

Applications are invited for this post, J.N.C. Scale "A" (£1215–£1390) on the staff of the General Manager and Engineer, J. Noel Wood, M.I.C.E. Commencing salary according to qualifications and experience.

Applicants must be Chartered Civil Engineers with experience in the design and construction of water treatment plant, control of staff and supervision of large contracts.

The appointment is subject to national conditions of service as applied by the City Council. Superannuable post; medical examination.

Alternate Saturday morning leave; car allowance. Attractive housing accommodation available to rent.

Applications stating age, qualifications, experience, present and past appointments (with dates and salaries) and quoting the names and addresses of two referees, must reach the undersigned by 9th July, 1959.

JOHN HEYS,
Town Clerk.

Town Hall,
Sheffield, 1. E6764

## EDUCATIONAL

**A.M.I.MECH.E., B.Sc.,** City and Guilds, &c. Guarantee Postal Courses for all Exams. and Technical Divisions from Elementary to Degree standard including Automation Techniques. Approximately 95 per cent successes. 148-page prospectus free on request.—B.I.E.T. (Dept. 22), 29, Wright's Lane, London, W.8. E114

**ELECTRONICS,** covering practical and theoretical aspects, basic principles, industrial applications, electronic apparatus, &c. Guaranteed coaching for Brit.I.R.E., City and Guilds, &c. Study at home under highly qualified tutors.—Write for free book: International Correspondence Schools, 71, Kingsway (Dept. 446A), London, W.C.2. E157

**AUTOMATION.**—AUTHORITATIVE COURSES are now available in Digital and Analogue Computer Technology, Applied Electronics, Data Processing and Instrumentation up to professional level by home study. Individual enrolment or industrial group scheme enrolments accepted. Syllabuses and prospectus sent on request.—Write (Dept. S.E.8), E.M.I. Institute School of Electronics, College House, Kensington, London, W.8. E145

## SITUATIONS VACANT

APPLICANTS ARE ADVISED TO SEND COPIES NOT ORIGINALS, OF THEIR TESTIMONIALS UNLESS OTHERWISE REQUESTED.

**A KEEN YOUNG ENGINEER** is required for interesting design work by a well-known company in Manchester marketing high-class fluid mixing equipment. Some experience in fluid mixing or the chemical industry generally is required but even more important is a desire to assimilate the background in the organisation and elsewhere appertaining to the subject and to apply this and basic technical knowledge to the solution of widely varying problems. A generous salary reflecting the quality of the work and the ability of the engineer selected will be paid. Your application stating education, training, experience, when available and salary expected should be addressed to D.M.D., Box No. E6790, "The Engineer".

### APPOINTMENT OF TWO TECHNICAL ASSISTANTS

Applications are invited from persons under 30 years of age who are competent draughtsmen and educated up to Higher National Certificate standard or equivalent in Mechanical or Electrical Engineering.

The successful applicants will be required to prepare drawings and assist in the designing, installation and maintenance of pumping plant and a wide range of ancillary equipment.

The commencing salary will be dependent upon qualifications and experience. There is a contributory pension scheme.

Applications should be made to the General Manager, Bristol Waterworks Company, Telephone Avenue, Bristol 1. E6794

**ASSISTANT MECHANICAL ENGINEER** required for small mining property in Kenya. The plant consists of diesel-driven generators, air compressors, quarry equipment, crushers, flotation plant and rotary kilns. The applicant should have good practical experience, and should be capable of acting for the Chief Engineer during his absence. He should preferably have included some drawing office experience in his earlier training. Continuous contract with 2½ years' tour and 4 months' leave on full pay. Salary according to experience. Passage paid both ways, including family after probationary period. Free, furnished quarters provided. Written applications stating full details of qualifications experience and age to Box C.397, c/o Streets, 110 Old Broad Street, E.C.2. E6792

### CHIEF INSPECTOR
**required immediately by**
NORTH BRITISH LOCOMOTIVE CO. LTD., GLASGOW

for new TURBINE DIVISION (steam turbines up to 15,000 kw.). Only men holding Chief Inspector's position will be considered. Preference given to those having turbine experience. Apply to Engineering Director, stating experience and salary required. E6808

**CIVIL ENGINEERS** between the ages of 24 and 27 required for design of Hydro Electric Works. Pension scheme. Salaries in accordance with qualifications and experience. Sir William Halcrow and Partners, Alliance House, Caxton Street, London, S.W.1. Telephone ABBey 4601.

### COMBUSTION DEPARTMENT
requires
SENIOR ENGINEER

with a sound technical training and experience in the design of new "conversion" installations (mainly liquid fuel).

Applicants must have an extensive knowledge of the design and operation of all types of INDUSTRIAL BOILERS and associated equipment, boiler auxiliaries, controls, instruments, etc., and be capable of designing and testing complete steam-raising plant.

Apply in writing only to:
R. L. Cox (Company Combustion Manager)
G. N. HADEN & SONS, LTD.
7–12 Tavistock Square, W.C.1. E6821

**DESIGNER DRAUGHTSMAN** required for work on Mechanical Handling Equipment. Superannuation, efficiency bonus and profit sharing schemes in operation and a house is available for the selected applicant. Applications stating previous experience should be made in writing to the Chief Draughtsman, Ewart Chainbelt Co. Ltd., Derby. E.2467

**DESIGNER DRAUGHTSMAN**
required, preferably with experience of plant layout in connection with the Food Industry; knowledge of refrigeration and mechanical handling would be an advantage. Qualifications—H.N.C. standard. Applicants should preferably be over 30 years of age and should state details of education and experience. Excellent Sickness Benefit and Superannuation Schemes, as well as the other usual amenities of a large and progressive company. Good salary and prospects.

Apply in writing to:
Assistant Company Personnel Manager
T. WALL & SONS (ICE CREAM) LTD.
59 Park Royal Road, N.W.10.
Stating Reference No. 300. E6799

**DEPUTY CHIEF MECHANICAL ENGINEER** required immediately by British firm of Consulting Engineers, for 3-year contract in India. Applicants should have good all-round steelworks engineering experience, particularly construction and installation of new plant. Administrative ability is also required. Successful applicant will be exempt from Indian income tax from date of appointment until April, 1962. Apply, with full particulars.—BOX No. E6769, "The Engineer." A

**DESIGN DRAUGHTSMAN** required for mechanical design of nucleonic instruments. Pleasant working conditions. Excellent rates of pay.—Apply Chief Draughtsman, ISOTOPE DEVELOPMENTS, LTD., Beenham Grange, Aldermaston, Berks. Tel.: Woolhampton 451. E152 A

**DESIGNER - DRAUGHTSMAN,** aged 25/40, required by an engineering company in Sussex. Applicants, preferably of H.N.C. standard, should be capable of stressing pressure and vacuum vessels, and be able to produce compact layouts of heat exchange plant, pumps and interconnecting pipework and valves with the minimum of supervision. This is a senior appointment carrying an appropriate salary. Please submit full details of experience.—BOX No. E6765, "The Engineer." A

### DESIGN ENGINEERS
required by
PILKINGTON BROTHERS LTD.
Glass Manufacturers, St. Helens,

to investigate the performance of existing furnaces for glass tempering and shaping and ultimately be responsible to the Chief Engineer for the design of furnaces for these purposes with all connecting equipment. Duties include production of initial design drawings for the building of prototypes. Ref. CEP/1.

to occupy a senior position in a large drawing office engaged on special problems. mechanical handling and plant layout. Ref, CH/1.

to design, test and commission automatic process machinery. Ref. TD/Mech.E.

to undertake project work on process development including work with pilot plants. This post is at Doncaster. Ref. TD/D.

to design instruments and small mechanisms in the Central Research Department shortly moving to Ormskirk. Ref. RES/A.

Minimum qualifications required are a good honours degree in Mechanical Engineering and some practical experience.

Superannuation, five-day week, assistance with house purchase and excellent recreational facilities are available.

Application is by form obtainable from: Personnel Officer (Graduate Recruitment)
PILKINGTON BROTHERS LTD.
St. Helens, Lancashire.
Please quote appropriate reference. E6805

### INSTRUMENT ENGINEER

A first-class opportunity has arisen for an Engineer experienced in the design of process control instrumentation, to join a major London Oil Refinery and Petro-chemical Engineering Company.

Applications should have at least H.N.C. with suitable endorsements.

Salary up to £1,600 p.a., according to experience. Please write giving full details in confidence to Box No. E6825, "The Engineer".

### POWER RECTIFIER DESIGN

Due to expanding business, a large electrical manufacturing firm in the Midlands requires assistant Design Engineers for rectifier work. Previous rectifier experience not necessary, but applicants should have degree (electrical) or equivalent, and some practical training. Work involves mercury arc and semiconductor rectifiers and application engineering of all kinds with scope for wide experience and interest; good salary and prospects. Pleasant residential area; ample housing; educational facilities excellent.

Apply with full particulars to Box No. E6819, "The Engineer".

### MECHANICAL ENGINEERS

COURTAULDS LIMITED requires Graduate Mechanical Engineers, aged 25 to 40, for important work in the design, construction and maintenance of large synthetic fibre and chemical plants. Candidates should have a good honours degree in Mechanical Engineering and preference will be given to those who have already completed a suitable apprenticeship and had two or more years' experience in the design or maintenance of industrial plant.

The vacancies are additional permanent appointments with very good opportunities for obtaining a wide experience in the process engineering and contracting fields and prospects of promotion for men with an original approach to problems are excellent. The work is exceptionally varied covering the complete range of engineering activities from heavy industrial equipment, including boiler and power plant, to fine mechanisms and highly specialised machinery of Courtaulds own design.

Successful candidates will be given the necessary background knowledge of the various processes concerned to enable them to further the development of modern manufacturing techniques and automatic control in the industry.

Financial assistance is normally awarded to married men when moving house. The appointments are pensionable and the occupants will be eligible for Co-partnership benefits.

Candidates should write for a detailed form of application to the Director of Personnel, Courtaulds Limited, 16 St. Martin's-le-Grand, London, E.C.1, quoting reference number B.55. E6813

### SENIOR PIPING ENGINEER

required by major engineering company engaged on many large contracts in the Oil, Petrochemical, Chemical and Nuclear fields.

The successful applicant will be aged 35–45, and with at least fifteen years' experience in dealing with pipework problems appertaining to the above industries.

A salary in the region of £2,500 p.a. is envisaged and only engineers with adequate experience and capabilities need apply.

Please write giving full details to:
General Manager, Box No. E6817, "The Engineer".

### TECHNICAL REPRESENTATIVE

required to fill a vacancy at both our Leeds and Leicester Offices. Sound education, preferably boarding school. Age 20/21 years.

Previous experience not essential but engineering background an advantage. Successful applicant would first undergo training at our Head Office and Works, Stafford.

The position carries, salary, car and expenses and the Company operates a contributory Superannuation Scheme. Apply in writing to: Weldmesh Sales Director, The British Reinforced Concrete Engineering Co. Ltd., Stafford. E6812

The Oil Refinery and Chemical Engineering Division of the
**MATTHEW HALL GROUP OF COMPANIES**
invite applications from engineers for the following appointments:

PROCESS ENGINEER

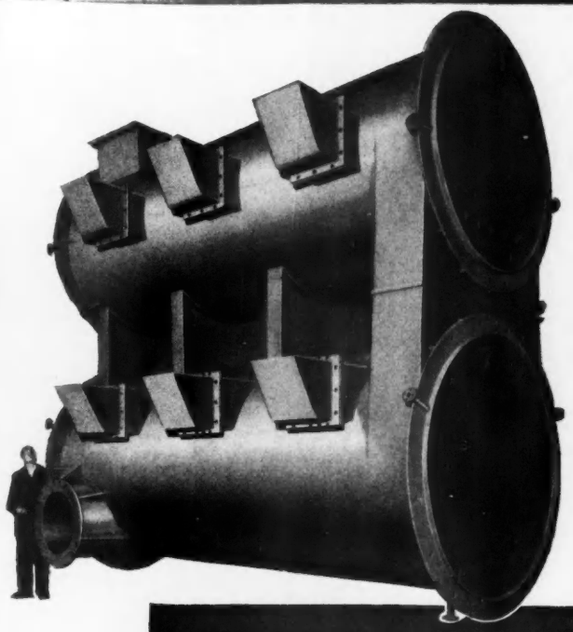
For the participation in the design, engineering and commissioning of large chemical projects. Applicants, with at least five years' experience, must hold B.Sc. in Chemical Engineering and should preferably be Corporate Members of the Institution of Chemical Engineers.

JUNIOR PROCESS ENGINEER

To assist in the design and commissioning of large petroleum and chemical projects. Applicants should be academically qualified in Chemical Engineering and previous experience in the petroleum and chemical industry is desirable but consideration will be given to new technical graduates who are prepared to undergo the necessary training.

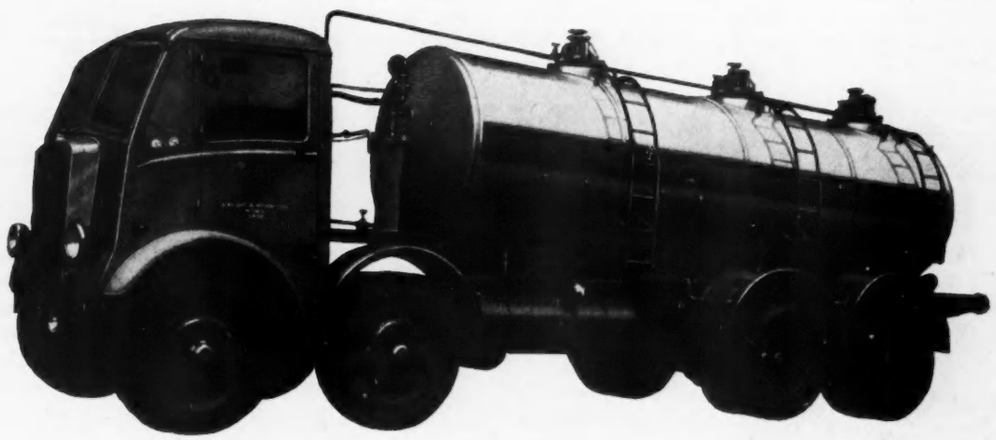
Please write in confidence giving full details of qualifications and experience to General Manager, Matthew Hall & Co. Ltd., Matthew Hall House, Dorset Square, London, N.W.1. E6818

**Classified Advts. continued on page 7**



# SPECIALISED FABRICATION

A large range of fabricated constructions is produced by Widnes Foundry & Engineering Co. Ltd. The three examples are typical of the skilful, comprehensive service offered to industry.



(Top) Mild steel casing, consisting of two shells; overall dimensions 17ft. 6in. long, 9ft. 3in. wide, 17ft. 10in. high. (Centre) Aluminium jacketted stainless steel road tank for transporting phosphoric acid. (Right) $\frac{3}{8}$in. Mild steel casing, weighing 4 tons, consisting of a cylinder and cone; diameter 9ft. 7in. tapering to 6ft. 2in. by 10ft. 4$\frac{1}{4}$in. long.

## WIDNES

**FOUNDRY & ENGINEERING CO. LTD**

ESTABLISHED 1841

**LUGSDALE ROAD · WIDNES · LANCS**

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**APPROVED BY LLOYD'S FOR CLASS II WELDING FOR PRESSURE VESSELS**

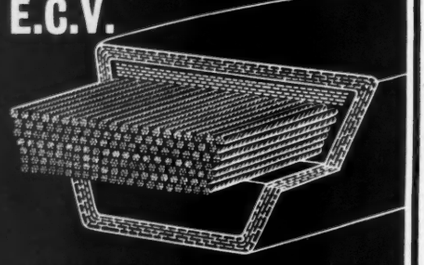
W 49

## Greater V-Belt reliability means more productivity

YOU CAN'T RISK costly shutdowns on full-scale production jobs – that's why Goodyear belts are the wisest choice for Multi-Vee drives. They can be fitted and forgotten – there's no better testimony to their trouble-free operation! There's a range of these 'job-designed' Goodyear V-Belts to give longer service and more efficient transmission on every type of drive.

The Goodyear Technical Man will gladly advise on the right belt for any job.

**E.C.V.**



**BELTS FOR MULTI-VEE DRIVES**

- Withstand high starting torques, sudden shocks and pulsating loads.
- Minimum stretch and creep.
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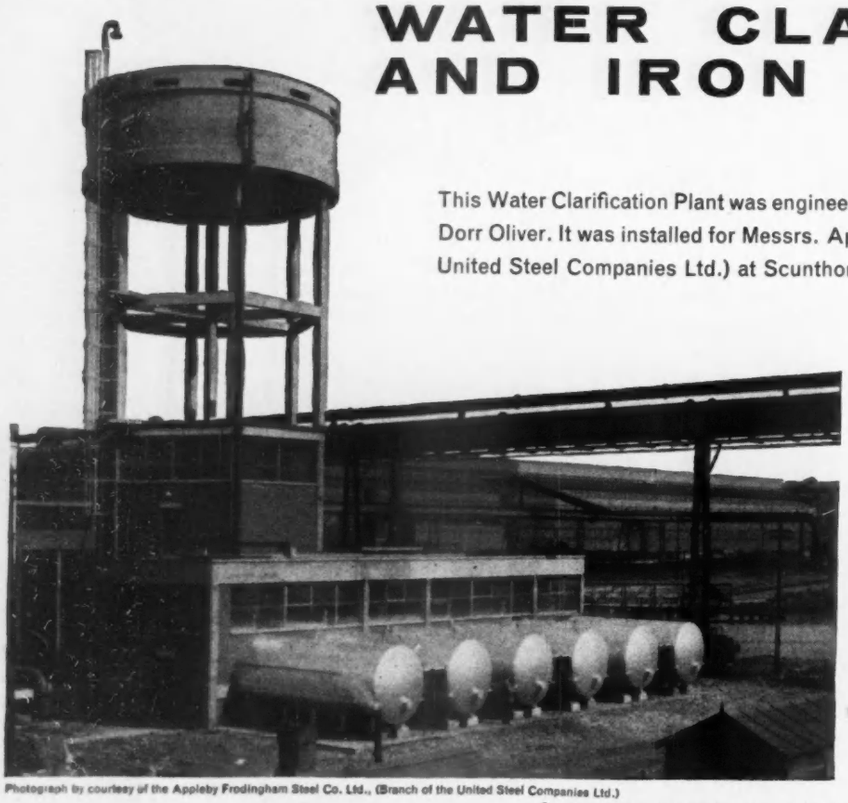
**GOODYEAR**

**INDUSTRIAL RUBBER PRODUCTS · CONVEYOR BELTING**
**V-BELTS · TRANSMISSION BELTING · HOSE**

# WATER CLARIFICATION AND IRON RECOVERY



Photograph by courtesy of the Appleby Frodingham Steel Co. Ltd., (Branch of the United Steel Companies Ltd.)

This Water Clarification Plant was engineered by Lodge-Cottrell in collaboration with Messrs. Dorr Oliver. It was installed for Messrs. Appleby-Frodingham Steel Company (Branch of the United Steel Companies Ltd.) at Scunthorpe, and enables them to re-cycle the rolling-mill water. A large part of the total flow is cleaned through sand filters to leave approximately 1 part per million of solids. Secondary filtration of the thick slurry, taken off as underflow from the Clarifier, is also provided.

*Another Filtration Plant, similarly engineered, has been in operation for three years at the Ebbw Vale Works of Richard Thomas and Baldwins Ltd. It recovers solids with an iron content of about 35%.*

*At the Steel Company of Wales' Works a Filter Plant to recover solids in cake form, with a water content of about 14% is now nearing completion.*

**Lodge-Cottrell**

**LODGE-COTTRELL LIMITED,** GEORGE STREET, PARADE, BIRMINGHAM 3.
Telephones: Birmingham CEN. 7714 • London CEN. 5488
*OVERSEAS AGENTS*
CONTINENTAL Europe: Leon Bailly, Ingenieur Conseil, Avenue des Sorbiers, Anseremme-Dinant, Belgium.
SOUTH AFRICA: Branch Office: P.O. Box 6070, Johannesburg.
AUSTRALASIA: F. S. Wright, 465 Collins Street, Melbourne, Australia.

L.C.40

# THE ENGINEER

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## LITTLE FREE TRADE AREA

Just over six months ago it was still possible—though only just possible—to hope that, concurrently with the coming into being of the European Economic Community and the first reductions of customs barriers between the six nations, Germany, France, Italy, Belgium, Luxemburg and the Netherlands, comprising the Community, there would be created a Free Trade Area covering a substantially larger number of countries. The Federation of British Industries, as we noted at the time, consulted its members about this latter project. It found that, allowing for dislike of the scheme within certain industries and by certain individual firms which have special reasons for fearing European competition (and allowing also for only a qualified degree of approval by others) British industry, as a whole, looked forward with some excitement to the opportunities for the expansion of trade which the coming of the E.E.C. and the F.T.A. promised.

But, sadly, all hope for the coming into force of this grand project in the near future must, it now seems, be given up. Instead over the last several months, seven countries, Austria, Denmark, Norway, Portugal, Sweden, Switzerland, and the United Kingdom have been studying the possibility of setting up a "Little Free Trade Area". There are, of course, difficulties to be overcome before such an area could be created. There always are difficulties about any international agreement. Notably the Danes, who are particularly interested in agricultural products, remain uncertain in mind about the project. But there is certainly a good chance that such an area might be created. The Federation of British Industries, therefore, recently consulted its members upon this as it had earlier consulted them upon the more ambitious project. Broadly it may be said that British industry favours the lesser project in much the same way as it favoured the larger. But it is strongly and sensibly concerned that the coming of an agreement amongst the "Seven" should not divide Western Europe into two hostile trading areas. The project for the setting up of a "Little Free Trade Area" of the "Seven" should, therefore, in the view of British industry, be pursued in such a way that it contributes constructively towards the formation of a trading association between the E.E.C. and the rest of Western Europe. There is, as before, deep concern that any agreement entered into for free trade in Europe should not interfere with the links between British manufacturers and the Commonwealth. Furthermore, just as it did for the grander project, British industry rightly insists that if and when detailed provisions for a treaty come to be considered, the Government should consult the individual industries which might be affected. This all sounds to us like good sense. Our only doubt relates to the possibility of creating the "Little Free Trade Area" without effectively dividing Europe. For however good the true intentions of the nations that set up that area may be much will depend upon the assessment made of it by the E.E.C. nations. Unfortunately some of the latter seem disposed at present to eye askance any economic project which this country favours!

## A RESTRICTIVE AGREEMENT?

The Trading Agreement of the Water-Tube Boilermakers' Association came before the Restrictive Trade Practices Court on Monday of last week. But by the unusually early date on which we had to go to press with this "emergency" issue no pronouncement had been made as to whether the Agreement was acceptable under the Restrictive Trade Practices' Act of 1956. The trading agreement, which the Association brought to the notice of the Registrar of the Court and which the Registrar decided the Court must pronounce upon, differs in several respects from arrangements originally agreed upon when the Association was formed in the thirties of this century at a time when cut-throat competition between boilermakers was having very adverse results. That original agreement had many of the attributes of a "price-ring". But a new Agreement was reached in February 1957 and six of the largest boilermaking firms in this country now work it. Several boilermaking firms in this country do not belong to the Association and one, at least, is capable of building plant as large as any member of the Association could supply. Under the new Agreement, upon which the Court may or may not have pronounced by the time these words are published, all six firms prepare independent tenders for any contract in which they may be interested. A meeting of representatives is then held. Before any details of the various tenders are revealed at this meeting there is a discussion to determine whether there are any special reasons why the contract should go to any particular member. Amongst such reasons may be a shortage of work in that member's shops or long-standing friendly relations with the customer, etc. On the basis of this discussion one member firm is designated the "preferred" winner of the contract. At this point details of all the tenders are revealed. They are carefully evaluated; and the "preferred" firm is given the opportunity to bring its price down to equality, on the

basis of equal value given for price received (as evaluated by the Association) with that of the lowest bidder. All the tenders then go forward for the customer to study. It will be observed that the customer is given two low bids from which to choose, in addition to being able to select a higher bid should he think it worth while because, perhaps, of some peculiarity of the design. No member, however, is permitted to lower his price once the Association has studied the tenders.

There can be no question but that the Court will make its decision on the basis of a legal interpretation of the meaning of the Act. One can but hope that this Agreement, which seems to us in many respects to be a model of its kind, will be found beneficial to the public within the meaning of the Act. For it seems clear to us that in certain industries it is highly desirable there should be a limit upon the lengths to which price competition can be pushed. In a number of industries, of which boilermaking is undoubtedly one, British firms cannot hope to prosper in competition with foreign firms in the world's markets unless there are rapid developments in design and in methods of operation and construction. The members of the Association, like the members of similar associations constructing other plant, need to spend and do spend large sums of money each year on research and development. Were there cut-throat competition between them can it be doubted that research and development would suffer? That argument may be deemed to have little relevance except in times of recession. But another consideration rules in times of boom. It is then very desirable that orders should be more or less equally distributed amongst the firms so that none is at any time unduly heavily loaded or unduly slack. We do not think the price mechanism acting alone could ensure so even a spread of orders in times of boom and depression and at prices reasonable to maker and customer alike as the mechanism devised by the Association, bearing in mind that at home and abroad international competition has to be met. We hope, therefore, that the Court has found or will find this Agreement acceptable under the law. It might well prove a pattern upon which other similar associations could base their practice.

## TRAINING STEELWORKS MANAGERS

Over the past three or four years, the British Iron and Steel Federation has organised management training courses. These courses, in which about 300 men from seventy steel plants have participated, constitute a piece of the Federation's experimental work, the value of which has become increasingly recognised throughout the industry. The courses have shown that if a man is freed for a period from the daily affairs of his department and given the opportunity to review his technical and managerial problems with other managers and with experts in particular subjects, he can not only consolidate his knowledge and experience, but extend it and increase his personal effectiveness. Now, as a result of these "experimental" courses, the British Iron and Steel Federation has formally established its Management College at Ashorne Hill, near Leamington Spa.

The courses, which are residential, are planned for a thoroughly representative cross-section of the various functions of management. It has been found that an ideal course takes in twenty-seven members, namely, nine from production departments, six from engineering and maintenance departments, three from research departments, three accountants and six from other departments such as labour, traffic and sales. In this way, all the principal functions of an iron and steel plant are catered for. There are two kinds of courses, the first of which occupies eight weeks in all, being arranged in two parts with an interval of about ten weeks. The other is a three-weeks' continuous course; it is designed mainly for men from smaller companies and deals principally with the rolling mills and finishing departments. The longer courses naturally provide more time and opportunity for the discussion of inter-departmental problems and are thus particularly suited to men from the larger works or from the large companies with a number of inter-related works. The method followed for each course is to consider an imaginary steel company, based either on an existing works or on a combination of the different departments of several works. The course members, in syndicates of nine representing each management function, work on projects dealing with those sections of the plant which have to be expanded or rebuilt, with such important matters as the more effective use of labour, safety and training, the integration of the modernised departments into a balanced works and with the revision of management organisation. Each project culminates in the preparation by the syndicate of a report which is presented to an assessor and then to a plenary session of the course members. The assessors are senior executives from the iron and steel industry who are acknowledged experts in the fields to be considered. Their comments and the discussions arising from them in the syndicates are, inevitably, the highlight of a course. We had an opportunity recently to be present at one of these syndicate assessments and discussions. The proceedings on that occasion certainly emphasised the value of the course. The arguments and counter-arguments that were put over in good committee fashion indicated that the participants were being encouraged to appreciate that the methods and procedures of their own companies might not always be the soundest and best in so great an industry as iron and steel! If these courses achieved nothing more than this free exchange of experience under the guidance of experts, they would be well worth while. But they go further. There is provision for group discussion on a number of topics—cost control, planned maintenance, systems of payment and marketing, for example—which all have a place in the art of management. Then, there is opportunity for practice in chairmanship and public speaking and during each course there are lectures by people who are eminent in such subjects as economics, research, labour relations and work study. Undoubtedly, as the work of the college proceeds its curriculum will be even more fully developed. After a couple of energetic and extraordinarily interesting days at Ashorne Hill, however, we felt assured by all we had seen and heard that its operations as a management college will prove increasingly beneficial to the efficiency of the iron and steel industry.

## EXPORTS AND INDUSTRIAL TRENDS

The final figures for the United Kingdom's overseas trade in May are encouraging. May is usually reckoned by the Board of Trade to be a good month for exports but this year a record value of just over £299 million was achieved. On the other hand the value of imports fell slightly from the high level recorded for April and the value of re-exports was much the same in May as in the preceding month. The result of all this is shown in the remarkably low figure for the visible trade gap at the end of May. It was no more than £1,500,000, the smallest, in fact, in the hundred years or so during which the country's trade accounts system has been operating. To the satisfactory export result now recorded for the month of May, the engineering industries made their customary notable contribution. According to the Board of Trade, there were "substantial rises" in the exports of machinery, cars and commercial vehicles. About the overall picture, the Board of Trade says that the rise in exports in April and May represents one of the sharpest changes in trend for a long time; in the two months taken together they were 13 per cent above the rate for the first quarter of this year and 8½ per cent higher than in the comparable months of 1958. Whilst it cannot be expected that this recent high rate of advance will be maintained, the figures lend support to the conclusion reached by the Federation of British Industries after its latest inquiry into industrial trends, that there is an "all-round improvement in the industrial situation".

# St. Lawrence River Development

## VI—Beauharnois Power Station

*The Soulanges section of the St. Lawrence Seaway is quite different in character from the Lachine section, which has been described in the earlier parts of this series. Between Lake St. Louis and Lake St. Francis the Seaway utilises the Beauharnois power canal, at the downstream end of which two locks have been constructed. This work has been in progress concurrently with the third and final phase of the construction of Beauharnois power station. Here the power station, shown on the right, is described.*

THE unique natural advantages with which the St. Lawrence River is endowed have already been stressed, but some reiteration is justified at this point, by way of introduction to the Beauharnois power station. To the engineer concerned in any way with hydro-electric development, Beauharnois is a fabulous power station. The vast, evenly-regulated flow of the St. Lawrence is here exploited fully and massively, but with a simplicity which could only result from the combination of an ideal site and an ideal river.

The head utilised is a low one, of 80ft. The river is impounded by a chain of dams stretching between islands just below the outlet from Lake St. Francis, which have crest gates of capacity sufficient to pass peak river flows. The natural level of the lake, however, remains unaltered; a canal of enormous dimensions leads from it to the power station, which is built on a good rock foundation, even though very little rock excavation was necessary in constructing the canal; its tail-race discharges into Lake St. Louis. The full capacity of Beauharnois is rated at 1665MW, corresponding to thirty-seven principal and two subsidiary generating sets, with an average flow of 210,000 cusecs at 80ft head. The general layout of the power scheme and of the two Seaway locks and other works associated with it, is shown in Fig. 23. Since the impression which the power scheme makes is one of vast size, we also give in Table X some of the principal statistical data for the operation of the power station and for its construction.

The first generating sets at Beauharnois have now been in operation since 1932. Most of the constructional work of the first phase was concentrated in the years 1930 and 1931.† This phase consisted of civil engineering works to accommodate fourteen 53,000 h.p. sets and two auxiliary sets, each of 8000 h.p. The original installation of generating plant, however, consisted only of the two auxiliary sets and four main sets. At that time the station was owned by the Beauharnois Light, Heat and Power Company.

The establishment of such a large potential source of power at Beauharnois made it a centre for industries depending on cheap electricity, and for export of power to other areas. Montreal, which is only 20 miles from Beauharnois, has been mostly supplied until now with power from this station and has for many years taken a great part of its output, but there are also grid connections to the Ontario power system and to other areas to the north and east. Thus, over the years, the load grew rapidly, but this was no problem to the Company, since the increase was merely taken up by installing additional sets. The regularity of the St. Lawrence shows to advantage particularly in years of low rainfall. When other power companies will be short of water, Beauharnois will work to virtually full capacity and export more units—an advantage, of course, which the station will always enjoy. The present owner of the station is the Quebec Hydro-Electric Commission, a public body responsible for electricity supply in Montreal and other parts of the Province of Quebec. Until the construction of the Bersimis scheme a few years ago, Beauharnois was the Commission's major source of power. The second phase of development, involving an extension of the power station capable of accommodating a further twelve 55,000 h.p. sets, was under-

TABLE X—*Statistics of Beauharnois Power Scheme*

| | |
|---|---|
| **Power production :** | |
| Ultimate installed capacity | 2,221,000 h.p. |
| Number and capacity of sets | 2 × 8,000 h.p.<br>14 × 53,000 h.p.<br>12 × 55,000 h.p.<br>11 × 73,000 h.p. |
| Ultimate annual power production | $12 \cdot 5 \times 10^9$kWh |
| Overall load factor | 86 per cent |
| Gross head | 80ft |
| **Hydrology :** | |
| Flow through power station at rated maximum capacity and gross head | 240,000 cusecs |
| Range of river flows : | |
| Maximum | 320,000 cusecs |
| Minimum | 190,000 cusecs |
| **Control dams :** | |
| Number of gates | 44 |
| Average width of gates | 42ft |
| Height of gates | 16ft to 35ft |
| **Power canal :** | |
| Length | 15 miles |
| Width | 3,300ft |
| Normal velocity of flow in canal | 2·25ft per second |
| Size of navigation channel | 600ft wide by 27ft deep |
| Length of upstream face of power house | 2,836ft |
| **Constructional quantities :** | |
| Total length of embankments | 50 miles |
| Ultimate total quantity of excavation | 250 million cubic yards |
| Quantities in first and second phases of work only : | |
| Canal excavation | 150 million cubic yards |
| Rock excavation in tail-race | 2,500,000 cubic yards |
| Concrete | 600,000 cubic yards |

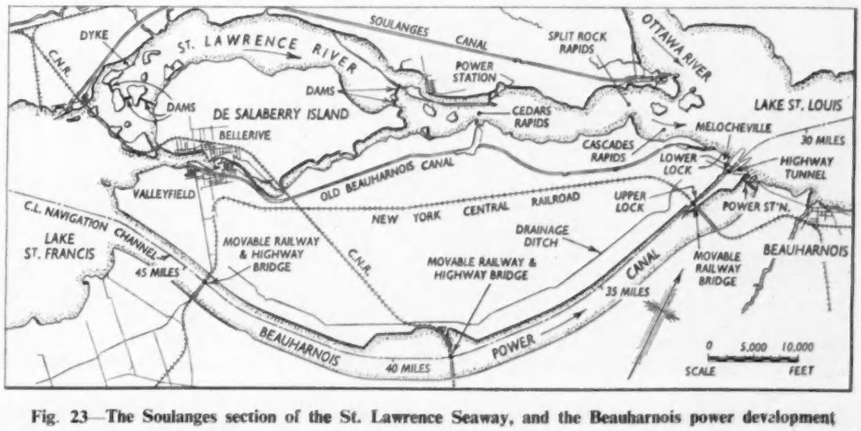



**Fig. 23—The Soulanges section of the St. Lawrence Seaway, and the Beauharnois power development**

† This stage of the power station's history was described in THE ENGINEER of February 13 and 20, 1931.

**Fig. 24—Beauharnois power station, showing the third and final extension under construction. To the right are the Seaway works also under construction. Note the old and new positions of the embankment upstream of the power house. On the downstream side, the new section of tail race, still "in the dry", is shown, with a road bridge leading across it to the tunnel under the lower Beauharnois lock**

taken in the year 1948 and, once again, additional sets were installed as the load grew. It was necessary, of course, to increase the capacity of the canal correspondingly with the power station, but this was envisaged when the canal was built. The Commission's large floating dredges have thus been at work continuously over the years, enlarging the canal cross section to keep pace with the installation of new sets. The Commission owns and operates the largest suction hydraulic dredge in the world : it is a 12,000 h.p., electrically operated craft with 42in suction and 36in discharge.

After the second phase works, however, the load grew more rapidly and the possible twelve additional sets were installed by the summer of 1953. Thus, construction of the third phase—a second extension of the power station capable of accommodating eleven more 73,000 h.p. sets, was begun at about the same time as constructional work started on the Seaway. The completion of this run-of-river plant will give the Commission a very efficient combination with the 2,000,000 h.p. Bersimis plants and their immense storage reservoirs.

### Final Extension of Beauharnois Power Station

The second phase extension terminated in a spillweir section, with two gated openings leading to a spillway which is separated from the main tail-race. Thus, some control of the upstream level at the power station is given. The third and last section of the station is built from the western side of this spillweir section, i.e. on the side next to the Seaway locks (Fig 24). It is characterised by massive reinforced concrete construction, carried on the hard sandstone rock escarpment which we refer to again further on, when describing the Seaway locks, and by a structural steel superstructure.

Concrete was brought by truck from one of three crushing, batching and mixing plants situated on the far side of the Seaway works, which were similarly supplied by the other two plants. Apart from size and speed of construction (once again there was a tight schedule for this work), the substructure works presented no unusual difficulties.

On the upstream side, the existing canal embankment sheltered the new work and enabled excavation and other works to be carried on behind it. A gravity dam wall in concrete was built from the end of the new power station extension to join with the new embankment. This embankment is of rock-fill, with a clay core sandwiched between graded "filters." The new head-race area was excavated and completed before the old dyke was removed. On the tail-race side, a cofferdam was built along the shore-line of the lake and then the tail-race excavated. A new road bridge was constructed.

Excavation of the canal to its ultimate cross section is still being carried out by the

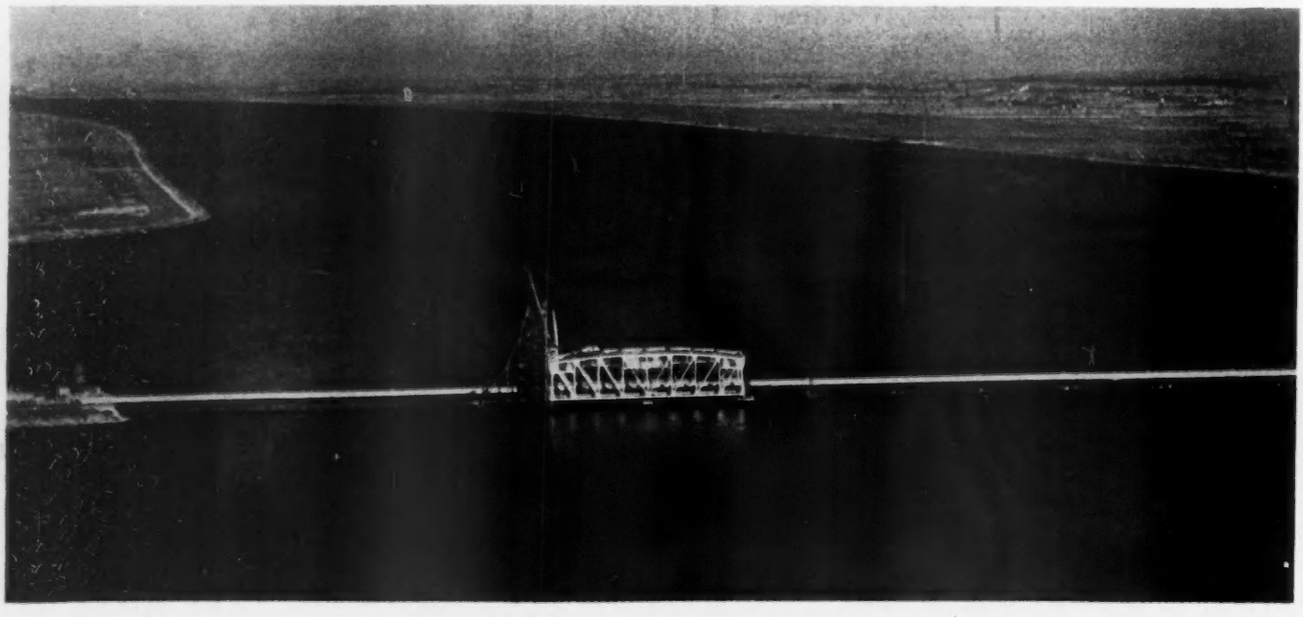


**Fig. 25—Modification to the bridge crossing the Beauhranois power canal. The lifting span has been built, and the first of the two towers is shown under construction**

Commission's dredges and is not due to be completed for a number of years yet. Of the total number of generating sets in this final extension, two have been installed and are in operation, ten having been ordered, leaving one to be installed at some time in the future. The small Cedar Rapids power station, shown in Fig. 23, will be maintained in working condition to use excess flow, or when maintenance work is being done on sets at Beauharnois.

The generating plant installed in the three phases of construction shows successive improvement, characteristic of the progress made in electrical and mechanical engineering over the past three decades. In the final extension fixed-blade propeller turbines are being installed, whereas in phases I and II, the turbines are Francis machines. The sluice gates of the third phase are also of interest. Each one has its own operating gear, but for maintenance can be lifted out of its guides by the rail-mounted cranes.

The third phase of Beauharnois was built under the direction of the engineering staffs of the Quebec Hydro-Electric Commission and H. G. Acres and Co., of Niagara Falls, Ontario, the principal contractor being Dufresne Engineering Company, of Montreal.

We should emphasise that the works described here are independent of the St. Lawrence Seaway Authority, and, strictly speaking, are an entirely separate project. Thus, the constructional quantities listed in Table X are separate from those listed in No. I of this series in Table V, and as can be seen, excavation for the Beauharnois canal will, in fact, be greater in extent than that for the entire Seaway. However, the ultimate existence of the Seaway, and its use of the Beauharnois canal, was envisaged throughout the conception and extension of the power scheme. Hence, the navigation channel in the canal and the disposition of bridges, which cross the navigation channel at right angles (Figs 25).

*(To be continued)*

# Permanent Way Recording Coach

A DIESEL-PROPELLED track recording coach equipped for assessing track conditions while travelling at speeds up to 30 m.p.h. was completed recently for British Railways by Elliott Brothers (London) Ltd., a member of the Elliott-Automation Group. The vehicle has a top travelling speed of 55 m.p.h. Methods of track recording have been studied over a long period by the British Transport Commission, whose investigations have included trial running with a Mauzin recording car loaned by French Railways. No existing equipment met all the requirements, however, and the new vehicle has been developed in conjunction with the Commission's research and development engineers.

The coach (Fig. 2) is a four-wheel vehicle, built under sub-contract to Elliott Brothers (London) Ltd., by D. Wickham and Co. Ltd.,

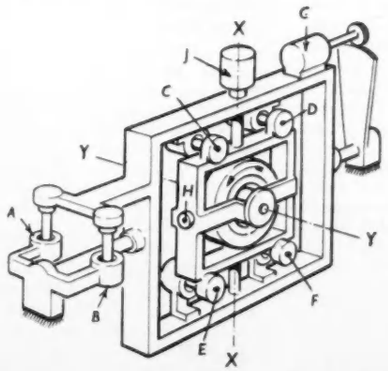



**Fig. 1—Horizontal gyroscopic datum for cant measurement**

and is powered by a Meadows 97 b.h.p. horizontal under-floor diesel engine driving through a centrifugal clutch and epicyclic gearbox to a forward/reverse gearbox on one axle. Suspension is by overslung laminated springs carried in hangers fitted with rubber sandwich inserts. The Timken double-tapered roller bearing axleboxes are connected with the frame by radius rods. As an adequate axle-load was necessary to detect voids under sleepers, the frame is of substantial fabricated construction with conventional buffing and drawgear. The body is also fabricated, and panelled inside and outside, with double doors near the centre on each side. Axle load is 12 tons. There is a driving position and observer's seat at each end of the coach. Main electrical supplies are provided by an Enfield diesel generator set providing 5kW at 230V d.c. A Vernons motor-alternator running on this supply gives a 400 c/s current for the gyroscopes and synchros.

Measurements of cant, curvature and gauge are given while the vehicle is in motion and are presented simultaneously on a multi-channel recorder as traces obtained on Kodak photo-sensitive paper by light beams from mirror galvanometers. An ultra-violet light source is built into the recorder. At the same time as a record is being made, a previous chart, taken over the same piece of track, can be viewed for comparison on an adjacent display.

For the measurement of cant (superelevation) a datum is provided by a high-speed gyroscope which enables the vehicle to operate accurately up to its maximum recording speed of 30 m.p.h., regardless of curvature or gradient.

The horizontal gyroscopic datum for this measurement is shown schematically in Fig. 1. It is mounted immediately above one axle, the position of which relative to the horizontal indicates the cant. Axis *X-X* is maintained vertical by the action of the offset weight *H* in precessing the gyro, so that *Y-Y* is the horizontal datum and is kept across the vehicle by torque motors *A*, *B*, controlled by the a.c. pick-off *J*. Torque applied to the main gyro frame, which is rigidly aligned in the fore-and-aft axis of the vehicle, causes the gyro to precess until the spin axis is again across the car. Compensation for the effect of centrifugal force on *H* is obtained by torque motors *C*, *D*. Tilting at the vehicle floor relative to the horizontal is detected by synchros *G*, and the angle between the floor and the axle is added electrically. Recordings can be carried on continuously throughout the longest runs without variation in accuracy since torque motors *E* and *F* correct automatically for the effect of earth rotation in the plane of cant measurement.

Gauge and curvature are measured by probes carried from a lattice girder framework supported at the axleboxes. There are four probes, of which three are on one side of the vehicle and act together to measure curvature by comparison of the versines at each end of the measuring base with the base line at the centre. The centre probe probe also acts in conjunction with one facing it on the opposite side of the frame to measure gauge, the setting being such that when the separation of the sensing heads is 4 ft. 8½ in. the resultant signal is zero. All probes are in effect linear synchros giving a.c. voltage outputs proportional to probe movement, the resultant signals being summed and demodulated for application as d.c. to the mirror galvanometers.

The sensing probes are spring-loaded against the rails and guide shoes, running in the opposite flange way, ensure their passage through gaps at points and other trackwork. At the actual opening in a crossing, the guide shoes come against the opposite check rail and prevent the sensing shoe from taking the wrong route. This patented Elliott guiding system makes it unnecessary to have a long probe in order to span the gaps at points or crossings. Their small size makes the probes highly sensitive detecting elements of low inertia. The rubbing face consists of a welded deposit which can be renewed when required.

When operating, the probes are held down by compressed air and can be withdrawn, clear of the track, when not in use. An emergency switch enables the probes to be retracted by the observer if obstructions are seen on the track. They can be lowered again when clear of the obstruction without stopping the vehicle.

The specifications of accuracy to which the equipment has been constructed are as follows:

Curvature—
Measurement of curvature down to 4 chains minimum radius.
Accuracy: ± 1/20 in. on versines up to 1 2/3 in. on a 33-ft. chord and ± 3 per cent thereafter.

Cant—
Measurement of cant expressed as inches of superelevation, up to a maximum of 7¼ in. (7 deg.).
Accuracy: ± ¼ in. (± 7½ minutes of angle).

Gauge—
Measured as deviation from standard (4 ft. 8½ in.) over range from 4 ft. 8 in. to 4 ft. 10 in.
Accuracy: ± $\frac{1}{16}$ in.

In addition to the main measurements, the record includes the speed of the vehicle, distance marking, facilities to indicate events such as passage through stations, and space for making notes. The new record, together with the "playback" of a previous record, are both fed through the recorder by a drive taken from one of the axle-boxes; a choice of scales is provided.

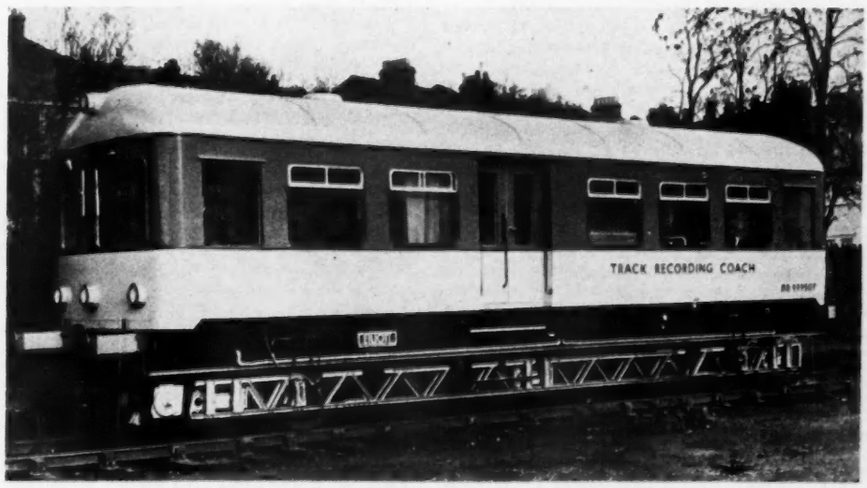



**Fig. 2—Diesel-propelled vehicle equipped for measurement of permanent way gauge, cant and curvature**

# Civil Engineering Models

THE Institution of Civil Engineers held its annual conversazione on June 17. One of the traditional events at this function is a display of models and research apparatus in the library. A few of the exhibits are briefly described here.

### Diorama of the Kalatuwawa Dam

The Kalatuwawa water scheme which is due to be completed later this year will augment the water supply to the city of Colombo, Ceylon, by 20 m.g.d.

A 3,400 acre catchment where the average annual rainfall is 162 inches has been developed by the construction of a reservoir of 3,110 m.g. capacity, formed by the erection of three dams, a composite concrete-gravity-earth-embankment structure of maximum height 72 feet and length 930 feet, and two smaller earth embankments. The largest structure is primarily a masonry-faced concrete gravity dam but some 225 feet adjoining the left abutment consists of a concrete-cored earth embankment. The gravity portion was constructed in small blocks with no contraction joints. Watertightness is obtained by a vertical membrane of high grade concrete at the water face while the hearting contains about 30 per cent rock displacers. The ski-jump spillway lies within the gravity section and discharges directly into the river channel. The dam was constructed by direct labour under the supervision of the consulting engineers for the scheme, Messrs. Binnie, Deacon and Gourley, between 1949 and 1954, the maximum use being made of the abundance of local labour and of local materials.

The water treatment works has been designed on the Paterson system and constructed immediately below the main dam. The treatment provided consists of aeration and sedimentation (using lime and alum in two tanks giving 2·4 hours retention) followed by rapid sand filtration, ten filters each 34 ft. square having been provided. These works also include a large filtered water tank and a wash recovery system.

### A Water Purification Plant in Egypt

A model of the Mehalla Kubra plant in Egypt was exhibited by the chief engineer of the Permutit Company Ltd. The model showed filtration and softening plant having a capacity of 10½ m.g.d., clarifying and softening the River Nile water. During certain periods the raw water has a turbidity exceeding 3,000 p.p.m. The installation supplies water for process purposes in the cotton mills of the Societé Misr pour la Filature et la Tissage, and the domestic supply for the families of the 24,000 operatives.

Raw water is drawn from the Sweet Water Canal by vacuum-primed pumps which deliver it to a flash chemical mixer where coagulants are added. Sedimentation is effected in two 112-ft. diameter Clariflocculators, followed by filtration in a battery of twelve gravity sand filters. Sterilisation is effected by chlorine gas and the purified water is pumped to a water-tower. The proportion required for process is softened by passing, without any break in pressure, through sixteen fully automatic ion-exchange units.

The water tower is unique in design in that it has two circular tanks for storing both the domestic and process waters and a bottom section is held as an emergency capacity for fire fighting.

### Measurements in Soil Mechanics

A nucleonic instrument for the in-situ measurement at the surface of soil density and moisture content was exhibited by Mr. R. Glossop (Soil Mechanics Ltd.). The instrument has been developed to assist in the control of soil compaction during the construction of roads, airfields and earth dams, where it is necessary to know the dry density of the material being compacted. The bulk density and moisture content of a layer about 6 in. thick are measured. This new instrument combines in one unit the density-measuring and moisture-measuring systems.

The density-measuring system is composed of a source of gamma rays and a Geiger-Muller tube. Normally the source, which is housed in a probe, is pushed into the ground to the depth to which measurement is required, and the intensity of gamma radiation is detected at the surface by the Geiger-Muller tube. When the soil is too compact to allow penetration of the probe, the source is retained at the surface and the gammas backscattered from the soil are detected by the Geiger-Muller tube. In both these methods the density is proportional to the intensity of radiation detected.

The moisture-measuring system consists of a source of fast neutrons and a boron trifluoride tube placed on the ground surface. The number of slow neutrons backscattered from the water in the soil and recorded by the $BF_3$ tube are proportional to the moisture content.

The source for both systems is radium beryllium supplying high energy gamma rays and fast neutrons. The counts from the Geiger-Muller and $BF_3$ tubes are recorded on a portable transistorised scaler, provided with automatic timing. The time taken to complete both the density and moisture measurements is about five minutes. With both systems it is possible to achieve an accuracy of about 1.5 per cent.

A soil penetrometer in which the change in penetration resistance with depth is plotted automatically was exhibited by the chief civil engineer, British Railways, Western Region. This instrument has been developed as an immediate aid in determining the shear strength of soils, and is being applied to the investigation of cess heave.

The penetrometer is a hand-operated, portable machine which produces autographic correlation of penetration resistance with depth, upon a graph. This graph may be studied on site and used in conjunction with other tests made in the laboratory. The apparatus is in three parts:

(1) Head and probe; (2) Load measuring mechanism; (3) Depth measuring mechanism. The head contains a piston, actuated by a loading handle, and working within a water-filled cylinder which rests upon the probe extension rods.

The loading handle is used to force the probe into the soil, the resistance encountered displacing water from the cylinder, through flexible tubing, to a measuring head which amplifies the movements of the probe. These are transmitted to a stylus which records the load characteristics. The roll of paper upon which the graph is plotted travels in proportion to the depth of probe, the movement being derived from a spring-loaded roller acting upon the probing rod.

### The "Hartley Hoister"

The model displayed was a 1/96 scale model of the hoister constructed at Mena-al-Ahmadi in Kuwait, invented by Mr. A. C. Hartley. The hoister enables an oil tanker at a sea berth some two miles off-shore to connect simultaneously with a 24-in. steel pipeline and a subsidiary bunker fuel line, and to maintain this connection without hazard throughout loading. The structure is basically four 12-in. steel pipes braced together to form a unit that pivots about an anchorage to the sea bed, having an overall length of nearly 100 ft. It projects well above the depth of water needed by the tanker. When not in use it lies flat on the sea bed. It is raised by buoyancy chambers which can be filled with air through a 2-in. hose line connected to a permanent buoy which also acts as a marker. Flexible hose connects the steel pipes of the hoister permanently to the submerged pipe lines and is also used for connections to the tanker's manifold. The stability and flexibility of the rarangement is such that both rough sea conditions and considerable movement of the tanker are safely catered for without interference to the maximum rate of loading. When submerged the hoister presents no obstruction to shipping and is quite undisturbed by storms. It was first tried out on the 28th-29th January 1959 and loaded the 32,310 D.W. tons tanker *British Courage* at the rate of 3,560 tons an hour. The model was shown by courtesy of the Collins Construction Co., of Texas, U.S.A., through Collins Submarine Pipelines Ltd., of 18 Park Street, London, W.1.

### Skidding and HighHy–steresis Rubber

A demonstration illustrating research on high hysteresis rubber in tyres, and its connection with skidding on wet roads was exhibited by the Road Research Laboratory. Recent work carried out by the laboratory and by Dr. D. Tabor of the Cavendish Laboratory Cambridge has shown that a significant contribution to the skidding resistance of tyres on a wet road surface can be provided by making their treads of rubber showing a relatively high energy slos in deformation (hysteresis loss). The exhibit comprised a simple demonstration to show the effect of hysteresis losses on friction, rubbers of differing hysteresis losses being slid over surfaces of different textures. Evidence from full-scale skidding tests was given to show the potential value of the effect shown in the demonstration.

### Motorway Viaducts

A model of the proposed Smethwick-Oldbury Viaduct on the Bristol-Birmingham Motorway was exhibited by the Ministry of Transport and Civil Aviation. Three motorways will converge on Birmingham—the London-Yorkshire Motorway, the Preston-Birmingham Motorway and the Bristol-Birmingham Motorway. A common meeting point south of Walsall for the two last-named motorways is under consideration, including a proposal for a three-mile viaduct above the Birmingham-Kidderminster Railway through Smethwick and Oldbury. The viaduct will enable the motorway to be carried through the heavily built-up areas of Smethwick and Oldbury without extensive demolition of property and interference with amenities which would otherwise have been inevitable. The estimated cost of the viaduct is £4 million.

The dual carriageways of the motorway, separated by a central reservation, will be carried on pillars straddling the railway lines. As well as maintaining headroom over the tracks the viaduct will also have to clear road bridges over the railway, so it will be built at a fairly uniform height of 45 ft. above the railway. There will be a flyover junction at the Wolverhampton New Road with slip roads linking the viaduct to the existing road system.

A model of a rather similar proposal—part of the proposed overhead length of the London-South Wales motorway-was exhibited by Sir Alexander Gibb and Partners. It is proposed to construct the London end of this motorway as a prolongation of the West Cromwell Road extension and the Chiswick flyover. If these proposals are accepted, the first 1¼ miles west of the flyover will take the form of an overhead highway of two 24-foot carriageways placed centrally above the existing Great West Road. The model showed the complete interchange facilities between the high and low level road systems planned between Lionel Road and Clayponds Lane in the Borough of Brentford and Chiswick. From this point westward there would be no further access to the motorway until Cranford Parkway is reached, a distance of ¼5 miles.

Except at the interchange, the structure of the overhead road will consist of central piers in reinforced concrete at 60 to 80 ft. centres, each with cantilevered cross beams to carry the deck. The deck will be formed of close-spaced prestressed precast reinforced concrete beams 2 ft. by 6 in. deep. The structure will be 60 ft. wide and the upper roadways will be 25 ft. above the lower. At the interchange, where the structure must widen to accommodate the junctions, extra piers will be introduced.

# Institution of Naval Architects in Portugal

TRAVELLING by sea, land and air the members of the Institution of Naval Architects converged in Lisbon where the Summer Meeting of the Institution was held at the invitation of the Ordem Dos Engenheiros. Members and their ladies assembled on Monday, June 8, and on the evening of that day there was a reception given by Dr. P. T. Pereira, the Minister of Presidency, at the Secretariado Nacional de Informacao (S.N.I.) Praca dos Restauradores when the visitors were able to meet their Portuguese hosts. The meeting was formally opened on Tuesday morning in the theatre of the S.N.I. when Commodore Naval Constructor Araujo welcomed the members on behalf the Ordem Dos Engenheiros.

In the afternoon a visit was paid to the Arsenal do Alfeite, the members crossing the Tagus by launch. The yard is mainly a naval establishment and acts as a maintenance base for Portuguese warships, and has five building berths ranging in length from 290 feet to 590 feet. Naval auxiliary vessels are built and at the time of the visit preliminary prefabrication work was going forward preparatory to building an oil tanker of approximately 20,000 tons deadweight. The activities of the day were concluded with a dinner held at the Espelho de Agua at the invitation of the Ministry of Marine.

At the dinner the Minister of Marine, Contra Almirante Quintanilha de Mendonca Dias, in a speech of welcome on behalf of the government, stressed the long association between Portugal and Great Britain and congratulated the Institution on the near approach of its centenary and its eminent place in the technical world. As with Great Britain, he said, the sea was of great economic importance to Portugal since it was the link between the different provinces in various parts of the world. He went on to refer briefly to Portugal's five-year economic plan which included the establishing, equipping and development of basic industries such as steel, shipbuilding, ship-repairing together with the expansion and modernising of the Merchant Navy. Viscount Runciman, the President of the Institution of Naval Architects replied and expressed the thanks of the members and said that it was not a matter of chance but rather of historical necessity that Portugal and Great Britain should have been allied for so long for both had many notable achievements in the art of navigation.

A coach tour on Wednesday, June 10, enabled the members to see a little of Lisbon and something of the countryside within a few miles radius of the city, including Sintra, Guincho, Cascais and Estoril. Before leaving Lisbon a call was made to see the white peacocks of the Castelo de San Jorge, which was originally a Moorish palace and citadel and is thought to have been given its present name by Queen Philippa of Lancaster the wife of King John I. From the battlements of the castle, high on a hillside, there is an excellent view of the Tagus and of Lisbon while a ruined church marks the limit of the devastation caused by the earthquake and tidal wave of 1755. On the way out of Lisbon to join the Sintra road it was possible to note some of the large housing schemes already completed or still in course of construction which form part of the rapidly developing city. About eight miles out a stop was made to look at the seventeenth-century Palace of Queluz which might be called the Portuguese Versailles and houses many examples of styles of furniture.

Lunch was taken at the ancient town of Sintra when the hosts were the S.N.I. and where Lord Byron once lived. Time unfortunately did not permit of visits to the Royal Palace or the old Moorish Castle perched on its hill top. From Sintra the route led to Montserrate with its beautiful park and its wide variety of botanical specimens and which before the war was owned by Sir Herbert Cook. Later in the day after a drive through the hills, where every turn opened up fresh vistas, the members arrived at Guincho where a reception was held at the Hotel da Praia at the kind invitation of the Companhia Uniao Fabril.

On Thursday afternoon the members toured the shipyard and dry docks of the Companhia Unicao Fabril where an interesting variety of ships extending from yachts to cargo ships were undergoing repair. There are five dry docks ranging in length from 145 feet to 570 feet, three floating cranes having lifting capacities of 45, 60 and 100 tons respectively and two building berths one of 393 feet and the other of 262 feet. Both submerged-arc and inert-gas welding equipments are installed, also crankshaft grinding facilities, dynamic balancing machines and provision made for non-destructive testing. While the shipyard visit was in progress the ladies were shown the Museu dos Coches including examples from the 17th century, the earliest being 1615, coaches from Italy and that used by King Edward VII in 1903. The ladies also visited the Mosteiro dos Jeronimos which is a fine example of the "Manueline" style of architecture and named after King Manuel the Fortunate, a direct descendant of John of Gaunt. This style links architecture with the sea and ships and could be called the Portuguese renaissance.

Lloyds Register of Shipping were the hosts on Thursday evening at the Club de Golf, Estoril, and afterwards several members of the party visited the Federation of British Industries Fair where there were on view many examples of heavy and light engineering including ships, marine engines, aircraft, aircraft engines, earth-moving equipment, machine tools, chemical plant, electrical and nuclear plant, and motor cars. The stand of the British Shipbuilding Industry depicted the activities of all branches of shipbuilding, ship-repairing, engine building and research and was supported by stands of individual firms. They included Richardsons, Westgarth and Co. Ltd., Swan, Hunter and Wigham Richardson, Ltd., Barclay Curle and Co. Ltd., Wallsend Slipway and Engineering Co. Ltd., and Vickers, Ltd. Many other firms were represented on group stands and an exhibit which could not fail to be seen was the Mirrless Mark, KSSM8 diesel engine which stood outside the entrance to the exhibition buildings.

On the last day of the meeting there was an interesting visit in the morning to the Fabrica Nacional de Cordoaria. Captain Acurcio Campos de Araujo conducted the party through works which are engaged in the manufacture of many products other than ropes. During the tour the party saw the production of sisal rope and wire rope, the manufacture of brooms, coir mats, coco-nut matting, sails, awnings, hoses and the complete process of weaving materials for uniform.

The final function of the meeting was the dinner given on the evening of Friday, June 12, by the Institution of Naval Architects, but before this event the members and their ladies, attended the Presidential Palace at Belem where, at a short ceremony, the President was presented with his certificate of Honorary Membership. Afterwards the members were presented to President Tomaz and spent some time on the terrace of the Palace. At the dinner Viscount Runciman welcomed the Institution's Portuguese guests and thanked them, on behalf of the members and their ladies for their generous hospitality and said that the success of the visit was in large measure due to the Minister of Presidency, Dr. Pereira, the Minister of Marine, Admiral Dias, and Commodore Naval Constructor Araujo. Dr. Pereira replied on behalf of the guests and referred to the transition of ship design from the purely functional and elementary to the final form and to the problems facing naval architects of combining space for passengers and cargo with speed and range at a rational cost. Commodore Araujo proposed the toast of the Institution of Naval Architects and said that the founding of the Institution nearly one hundred years ago had led to the formation of similar societies in many countries.

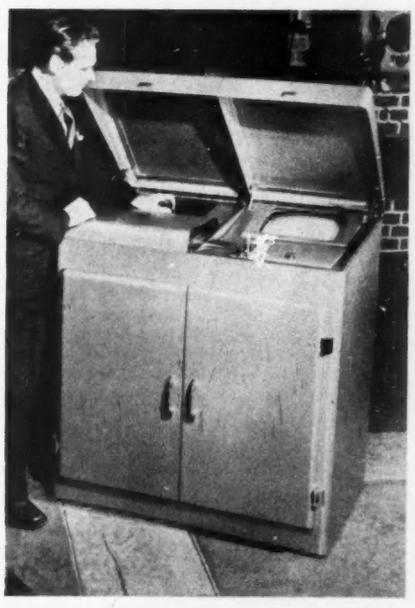
## Television Films by Transatlantic Cable

TELERECORDED film transmitted from Canada over the Transatlantic telephone cable was shown for the first time in the B.B.C. television news at 6 p.m. on June 17. The system used has been developed by the B.B.C. Engineering Division in order to reduce the time elapsing between filming an event on either side of the Atlantic and broadcasting the film on the other side. Hitherto it has not been possible to telerecord film over the Transatlantic telephone cable because of the low maximum video frequency imposed by the cable characteristics. The new Motion Picture Facsimile Equipment (M.P.F.E.) therefore effects as many economies in the bandwidth of the video signal as are compatible with acceptable picture quality, reducing the normal 3 Mc/s bandwidth of the British television system so that the maximum video frequency to be transmitted corresponds with the 4.5 kc/s upper limit of the cable.

The methods adopted are:

(1) A reduction of the horizontal definition to that corresponding with a bandwidth of 1.75 Mc/s in the 405-line system.
(2) A reduction to 200 lines using sequential scanning.
(3) The scanning at the transmitting end of only alternate film frames, each frame-scan being reproduced on two adjacent film frames at the receiving terminal.

The above measures reduce the 3 Mc/s bandwidth to approximately 450 kc/s, and the remainder of the bandwidth reduction is obtained by a decrease of the scanning speed until the maximum video frequency corresponds with the available 4.5 kc/s upper limit. The time required to scan the film is approximately 100 times normal, so that a half-minute news flash takes approximately



**Console with flying spot scanner and telerecording facilities for transmission and reception of television film pictures by the Transatlantic telephone cable**

50 minutes to transmit. The sound is transmitted separately. At a demonstration of the system at the Alexandra Palace which we attended on June 17 it was estimated that a half-minute film item could be available for transmission in less than an hour and a half, including developing and editing. On this occasion film taken of the guests arriving shortly after 4 p.m. was included in the news bulletin at 6 p.m. Pictures transmitted from Canada during the meeting were seen being received on the apparatus and were included in the same news bulletin. Sir Harold Bishop, Director of Engineering, B.B.C., whose address was filmed and then transmitted to Canada, expressed the Corporation's gratitude for the co-operation in this development of the General Post Office, the Canadian Overseas Telecommunica

tions Corporation, the American Telephone and Telegraph Company, and the Canadian Broadcasting Corporation.

The M.P.F.E. equipment is illustrated. It acts both as a flying spot film scanner when transmitting and as a telerecorder when receiving. The film spools (using 16 mm. film) are below the cover on the right, in front of the monitor tube. This has a long-persistence phosphor so that an observer can see each picture being built up although the total time for a complete field scan is approximately eight seconds. A single internal cathode ray tube serves both for transmission and reception. Rack-mounted line translating equipment receives the slow-speed video signal from the scanner and converts it for transmission over the cable into the form of a 5 kc/s carrier frequency with a special form of negative-going amplitude modulation in conjunction with vestigial sideband transmission. A synchronising signal is sent at the beginning of each line-scanning period, and this signal at the receiving end operates the film traction mechanism in the M.P.F.E. console, causing it to pull down two film frames at a time, each receiving the same image through twin optical systems. The effective picture repetition frequency of 12½ per second is satisfactory for reproduction of most material, except where rapid motion occurs. In this case special provision is made for transmitting every frame of the film, this, of course, doubling the transmission time.

The apparatus was used for transmitting a film to Canada showing the departure of the Queen and Prince Philip from London Airport on June 18 for their Canadian visit, and later in the same day for recording film of their arrival in Canada.

## High-Precision Taper Roller Bearings

A few years ago the George Cohen 600 Group Ltd. acquired the manufacturing rights of the Gamet precision taper roller bearing made in France by La Precision Industrielle. Technicians were sent to the French factory to study production methods and the company Gamet Products Ltd. was established to manufacture high precision bearings for the British machine tool trade. As a result of the increasing demands for the bearings it was decided in 1956 to lay down for their manufacture a new factory, specially designed and equipped with similar plant to the parent works. This new factory at Hythe, Colchester, is now in production and was recently officially opened by Sir Leslie Robinson.

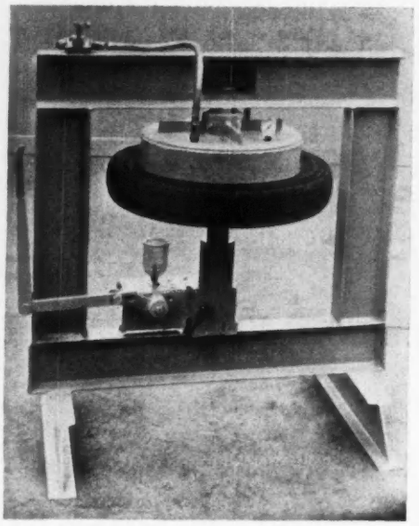
Gamet bearings have a substantially lower roller and track angles to those of conventional taper roller bearings and their rollers are hollow. The use of hollow rollers within a fairly close fitting aluminium alloy cage, it is stated, considerably reduces temperature rise of the lubricating oil particularly when the bearings are in high speed service. A constant flow of oil passes through the bores in the rollers to combine a cooling effect with lubrication, and this serves to reduce the temperature differential between the inner and outer rings of a bearing. The balanced degree of expansion thus attained in the bearings enables them to maintain their initial adjustment over a wide speed range without loss of accuracy or rigidity.

A point of particular interest in the manufacture of these bearings is that all their components are made to extremely fine dimensional limits and surface finish and, as distinct from the usual practice in making precision bearings of this kind, there is no selective assembly of parts. The accuracy involved in the manufacturing processes for the individual standard components can be appreciated when it is realised that bearings of up to 6-in. bore are guaranteed to be within the following tolerances—radial runout 0.000039 in., side runout 0.000117 in., bore and outside diameter tolerance 0.000197 in.

At present the firm is producing single and double row bearings with plain or flanged outer rings with bores from 35 mm. to 210 mm. and outside diameters from 72 mm. to 310 mm. In addition to these standard sizes special bearings are made for particular applications and complete with their shaft assemblies when required.

## Tubeless-Tyre Inflation Machine

A HAND-OPERATED machine for inflating tubeless-tyres up to a maximum pressure of 40 lb per square inch, is being made by The Hymatic Engineering Company, Ltd., of Glover Street, Redditch, Worcs. The machine, which will operate from ordinary shop air lines delivering clean air at 70–100 lb per square inch, is illustrated below.



**Wheel with tubeless-tyre being inflated in hand-operated machine**

The machine has a sectional steel frame with a fixed upper and an adjustable lower platen. A wheel, with tyre and valve already assembled, is placed on the lower platen on which the rim seals on an annular rubber ring. Operation of a hand-operated hydraulic jack raises the lower platen until the wheel rim seals against a rubber ring on the top platen. When the rubber seal on the top platen is firmly in contact with the upper edge of the wheel rim, an outer ring on the top platen will have depressed the upper side wall of the tyre, leaving a gap between the upper tyre bead and the wheel rim. The hydraulic jack is then locked before air is admitted to the upper platen by opening a valve on the upper cross member of the machine. The air passes into the tyre through the gap between the tyre bead and the rim, and this forces the lower bead against the rim, thereby sealing it.

Air pressure in the platen and tyre is registered on a pressure gauge on the top of the platen, and when it is about 15 lb per square inch above the required tyre pressure the air valve is closed and the hydraulic isolator valve opened. The air pressure in the tyre rapidly forces the lower platen downwards and the upper tyre bead snaps into place, completing the tyre/wheel seal. As this seal is made there is a slight pressure drop in the tyre, which is allowed for by the excess pressure.

The standard machine is fitted with platens to accommodate wheels with 13in, 14in and 15in rims, but interchangeable platens can be supplied to accept larger or smaller wheels. The Hymatic Engineering Company, Ltd., also manufactures in-line fitting and inflation machines which are automatic in operation, and are designed to fit and inflate up to 300 tyres per hour to any given pressure for use in automobile factories.

## Books Received

*Theory of Machines Through Worked Examples.* Third edition. By G. H. Ryder. Cleaver-Hume Press, Ltd., 31, Wright's Lane, London, W.8. Price 21s.

*Engineering Drawing with Worked Examples.* Vol. 2. By F. Pickup and M. A. Parker. Hutchinson and Co. (Publishers), Ltd., 178–202, Great Portland Street, London, W.1. Price 21s.

*Basic Electronics.* By J. Daly and R. A. Greenfield. Heywood and Co., Ltd., Carlton House, Great Queen Street, London, W.C.2. Price 45s.

## Appointments

MASSEY-FERGUSON LTD. has announced that Mr. T. J. Emmert has been appointed a vice-president.

THE ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS announces that its new chairman is Mr. C. G. Aldridge.

MR. DENIS A. MONK, A.M.I.Mech.E., has been promoted to the position of general manager, Peabody Ltd.

THE DICTAPHONE CO. LTD. announces the following appointments: Mr. C. K. Woodbridge, chairman, has been appointed managing director and Mr. T. H. Beard, Mr. W. H. M. Barber, Mr. T. G. O. Hull, Mr. H. C. Spiers and Mr. T. Wilson have been elected directors.

STEEL, PEECH AND TOZER, a branch of The United Steel Companies Ltd., announces that Mr. F. Moore has been appointed chief engineer in succession to Mr. V. Watkins who has retired, and Dr. B. B. Hundy has been appointed chief research metallurgist in succession to Mr. A. G. Snape, who has also retired. Mr. Snape is to remain with the company for twelve months in an advisory capacity.

## Business Announcements

ASQUITH MACHINE TOOL CORPORATION LTD. states that the name of its subsidiary sales organisation Drummond-Asquith (Sales) Ltd., has been changed to Drummond-Asquith Ltd., King Edward House, New Street, Birmingham.

SQUARE D. LTD. has opened a Bristol branch office at 46 Queen Square, Bristol, 1 (telephone Bristol 20995). Mr. G. W. T. Hall has been appointed branch manager.

THE METAL INDUSTRIES GROUP has announced the formation of a new company Fawcett Preston (Europe) S.A., 6 Square de l'Opera, Paris, 92, to handle the sales and service of products manufactured at Bromborough, Cheshire, by Fawcett Preston and Co., Ltd.

W. CANNING AND CO. LTD., P.O. Box 288, Great Hampton Street, Birmingham, 18, announces that it has acquired a holding in the Australian company Lawrence Smith and Co. (Pty.) Ltd., Sydney. The name of the Australian company is to be changed to Lawrence Smith and Canning (Pty.) Ltd.

THE WALLSEND SLIPWAY AND ENGINEERING CO. LTD., P.O. Box No. 4, Wallsen-on-Tyne, and Hubbard Combustion Ltd., have announced the amalgamation of the two companies.

THE UNITED STEEL COMPANIES LTD., 17 Westbourne Road, Sheffield, 10, announces that it has become a shareholder in Concast A. Gl, of Zurich, and that Mr. G. N. F. Wingate, director and general manager of Distington Engineering Company, a United Steel subsidiary, has joined the Concast board. The Schloemann Company of Dusseldorf, and the Campagnie des Forges et Acieries de la Marine et de St. Etienne S.A., Paris, have also become shareholders in Concast A.G.

F. PERKINS LTD. announces that a 140,000 sq. ft. factory at Walton, Peterborough, is to be used to manufacture the new 6, 16 and 35 h.p. outboard motors marketed by its subsidiary Perkins Outboard Motors Ltd.

## Miscellanea

MELTING AND HOLDING FURNACES.—An aluminium melting and holding furnace is now made in standard sizes for throughputs of 125 lb to 1000 lb of aluminium per hour by Hedin, Ltd., Commerce Estate, South Woodford, London, E.18. These furnaces are also suitable for melting zinc, magnesium and lead, and they are stated to provide molten aluminium at a rate of 5 lb per kilowatt-hour melt and hold. The furnace section in which metal is melted is heated by radiation by silicon carbide rod elements and the molten metal runs down a slope into a holding bath where it is held at the required temperature under thermostatic control. The furnace is lined with iron-free refractory backed by an adequate wall of insulating material.

PHOTO-ELECTRIC FLOW ALARM.—A photocell device and relay are now available from the Rotameter Manufacturing Company, Ltd., 330, Purley Way, Croydon, Surrey, for operating an alarm in preset conditions of flow as indicated by "Rotameter" flow meters of types 907 and 914 in the company's industrial "Metric" series. The light source (a 6V, 6W lamp run at 4V), the cadmium sulphide photocell and a junction box are clamped to the "Rotameter" chassis. The relay, microswitch (5A, 230V a.c. rating), mains transformer and rectifier are housed in a separate steel case measuring 7½in by 4½in by 5in, with wall-mounting lugs. A choice of mains voltage tappings is provided, and a selector plug inside the case allows the output voltage to the lamp to be adjusted to compensate for different lengths of lead.

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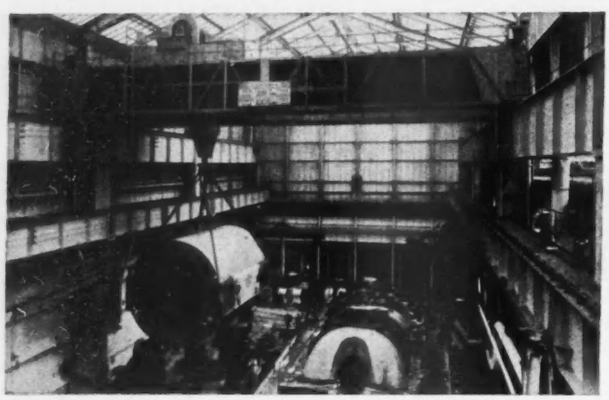
# A CLYDE BOOTH 200 TON CRANE



Clyde 200 tons electric overhead travelling crane in the turbo-generator erection shops of Messrs. C. A. Parsons & Co. Ltd., Newcastle.

This crane of 200 tons capacity is quite large as electric overhead travelling cranes go, but it is by no means the largest of our productions.

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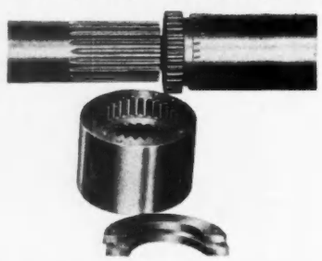

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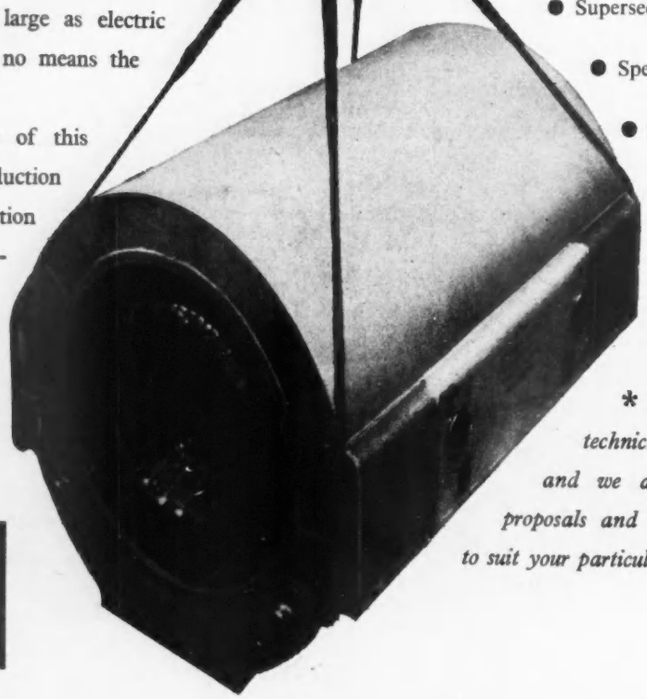

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## SITUATIONS VACANT

**TECHNICAL PRESS OFFICER** required at the London Headquarters of the N.C.B., to assist in publicity campaign on the use of coal in Industry. Applicants should have experience in the technical journalism of steam and combustion engineering, or practical experience in these subjects and the ability to write effectively on them. Appointment superannuable, and inclusive salary, depending on qualifications and experience up to £1,400 per annum. Write giving full particulars (in chronological order) of age, education, qualifications and experience (with dates) to Staff Department (X.1440/2F) National Coal Board, Hobart House, London, S.W.1, by 17th July, 1959. E6807

**YOUNG MEN REQUIRED** to train for managerial posts in a progressive steelworks. Preference will be given to applicants holding H.N.C. or equivalent in Metallurgy or Engineering. Previous steelworks experience not essential. Salary will be commensurate with qualifications and experience. These are positions with very good prospects. Staff position, pension and free life assurance schemes, &c. Please apply, stating age, qualifications and experience.—BOX No. E6709, "The Engineer." A

## SITUATIONS VACANT

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Classified Advts. continued on page 8

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